

## PRACTICAL PHYSICS.

*A Text-book of Practical Physics.* By Dr. William Watson, F.R.S. Pp. xvi+626. (London: Longmans, Green and Co., 1906.) Price 9s.

SMALL books on practical physics have been very plentiful of recent years since the subject has taken a place in schools, but the number of large and complete treatises in English embracing all branches is still few. Looking back the present writer can recall to mind as the earliest an English translation of Kohlrausch's "Leitfaden" by Waller and Procter, published in 1873, and the book, in two volumes, by E. C. and W. H. Pickering, on "Physical Measurements," published in 1873 and 1876. The latter was founded on the course of practical physics conducted at the Boston School of Technology by the authors, who have since become two of the foremost astronomers of the United States. After these two books we have to pass to 1884, when Glazebrook and Shaw's "Practical Physics" was published. It was founded on the elementary practical course conducted in the Cavendish Laboratory, Cambridge, and is still in use, and is perhaps the one book on practical physics which has had the widest influence on English laboratory methods. All these books placed the side of accurate measurement before the student, and omitted demonstrations and showy lecture experiments from their contents. They were written for the student's use in the laboratory, and formed a great advance on the descriptive books in which physics and chemistry were mixed, and which constituted the science of the popular lecturer of the early and middle Victorian period.

Later came a treatise by Balfour Stewart and Gee, which contained very detailed descriptions of experiments in properties of matter and in magnetism and electricity. The book came from the Owens College Laboratory at Manchester, and was, we believe, the first in which precise descriptions of magnetic methods appeared. Then from the same laboratory, published in 1901, we received a course of experiments by Schuster and Lees. This book contained only selected exercises from different branches, as the authors considered it sufficient to put before the students a short course of typical experiments.

Now we have before us the latest book on the subject, a complete treatise by Prof. W. Watson, of the Royal College of Science, South Kensington, and it is framed on a plan different from those we have mentioned. Prof. Watson calls it a book of reference for the student when working in the laboratory. It is not intended that any one class shall work through all the experiments, but that the teacher shall select from it according to the requirements of the pupil and the resources of the laboratory. The descriptions and hints apply to almost any form of apparatus suitable for the particular experiment.

As to the contents of the book, the first chapter  
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contains a general discussion of the theory of the treatment of experimental data, the use of logarithmically divided papers, the consequent determination of exponential laws, and the description of calculating machines, including arithmometers and planimeters. It would take too long to go in detail through the entire contents of the book, but to illustrate its scope we may mention that thirty-four chapters are required to cover the whole field of physics. At chapters xxxii. and xxxiii. we are brought to magnetic induction and permeability. The comparisons and absolute measures of the induction coefficients are treated very fully indeed, and in chapter xxxiv. the use of the Dolezalek form of quadrant electrometer and the measure of the saturation current through air in the presence of uranium oxide are described. It will be evident that the author has made the field covered by the book very wide, and has brought into prominence the methods of recent research. We cannot omit to mention the excellent chapters which occur earlier on magnetic measurements and on the constants of terrestrial magnetism, subjects in which the author is a well-known authority.

At the end an appendix, probably one of the most useful parts of the book, contains an account of laboratory arts, glass-blowing, working in quartz, silvering, and other necessary processes. To these descriptions we feel very confident in referring the student, for the great excellence of the Royal College of Science in the branch of laboratory arts is well known. There is also a collection of useful tables.

The book is printed in very clear type, and the diagrams are excellently drawn. The whole setting of the book is of the same high standard as that of Prof. Watson's large work on physics.

Judging from the short experience which we have had of the use of the book in the laboratory, we may conclude by saying that it has proved most acceptable to the students, and we have been able to recommend it to those studying for university degrees. Schoolmasters should have a copy for reference and for their higher work.

S. S.

CLASSIFICATION OF SOUTH AFRICAN  
STONE IMPLEMENTS.

*The Stone Implements of South Africa.* By J. P. Johnson. Pp. 53. (London: Longmans, Green and Co., 1907.) Price 7s. 6d.

THIS is a useful addition to our acquaintance with the Stone Age of South Africa. Mr. Johnson has exceptional qualifications for the task he has undertaken, being a trained geologist and surveyor, and a competent observer in the field, whilst his travels have given him the opportunity of examining large sections of South Africa, the collections of implements described having been obtained by himself from localities so widely separated as the valley of the Zambezi, the Transvaal, Prieska, in the north-

west of Cape Colony, the Orange River Colony, Algoa Bay, and various intermediary stations.

In this volume, which contains 258 illustrations, Mr. Johnson has confined himself to coordinating the various discoveries of stone implements he has made during the past four years in South Africa, with descriptions of the deposits from whence they were derived; he, however, makes no attempt to review the abundant literature on the same subject already published. The exceptional value of the author's work rests in the fact that he makes little or no direct reference to surface finds or to specimens of man's handiwork which, in the shape of flakes, cores, and implements, are scattered over the surface of South Africa, in extraordinary profusion in some localities; but in every instance in which he describes his "finds" he takes us to the actual deposits from which he extracted the implements, whether it be the high plateau gravels in the neighbourhood of Johannesburg, the river gravels of the Zambezi, Vaal, and Orange rivers, the more recent alluvial deposits of the country, or the middens on the coast of Algoa Bay.

The author divides the stone implements of South Africa into three groups, which he considers well defined, namely, Primitive, Palæolithic, and Advanced; these are, in his opinion, the South African equivalents of Eolithic, Palæolithic, and Neolithic. The artificial character of the implements of the primitive group is, the author admits, still a matter in dispute, but when we come to the Palæolithic group we reach sure ground. If the old level gravels of the Zambezi, below the Victoria Falls, from which undoubted Palæolithic implements have been derived, were deposited prior to the retrocession of the present falls, and there is strong evidence in favour of such being the case, then the presence of man in South Africa is relegated to a past, bewildering in its antiquity. Similar conclusions are arrived at from the presence of Palæolithic implements in the old river gravels of the Vaal and Orange rivers. When we compare the more carefully fashioned implements (which, however, are not represented in Mr. Johnson's illustrations), notably from the Cape Flats, the laterite beds of Natal and Zululand, from rock shelters and the caves and middens of the coastline of Table Bay and Algoa Bay, with the rude weapons of the old river gravels, we unquestionably find a progressive element in their making, though they are not comparable in artistic merit with those found so abundantly in Egypt, for instance. This perhaps may be due to the stone-implement makers of South Africa not having had at their disposal equally suitable material to work on.

Though Mr. Johnson's division of the stone implements of South Africa into three definite groups may be considered by some as perhaps premature in our present state of knowledge, yet it is a step in the right direction, and this volume with its useful illustrations will certainly be welcomed by students of South African prehistoric archaeology.

#### OUR BOOK SHELF.

*Pocket-Book of Aeronautics.* By Hermann W. L. Moedebeck, in collaboration with O. Chanute and others. Authorised English edition, translated by W. Mansergh Varley. Pp. xiii+496. (London: Whitaker and Co., 1907.) Price 10s. 6d. net.

In this handy little volume we have an excellent comprehensive summary of the whole subject of aeronautics, and the English reading public have to thank Major Moedebeck for producing such a work which has been so capably translated by Mr. Varley.

Although called a pocket-book, the book might really be described as a treatise on the subject, so ably and so well arranged is the mass of material dealt with. In fact, the book takes a very broad view of aeronautics, and leads off with chapters on the physical properties and technology of gases, the physics of the atmosphere, meteorological observations in balloon ascents, and the computation of results. Such a beginning is an indication of the very scientific and complete way in which the author set about bringing the matter pertaining to aeronautics to a focus, and his various collaborators, ten in all, have succeeded notably in their task.

Further, the historical survey of previous attempts to gain the supremacy of the air is by no means omitted, and admirable summaries are included which give the reader a comprehensive and intelligent view of the steps taken in each mode of attempted flight.

To give some idea of the contents and authors who have contributed to the book, it may be mentioned that the subjects referred to above are from the pens of Dr. R. Emden, Lieutenant J. Stauber, and Prof. V. Kremsner. The articles on the technique of ballooning, on ballooning, on military ballooning, historical account of artificial flight, and on air-ships, are treated by the author. Prof. W. Köppen deals with kites and parachutes. Dr. Miethe deals with balloon photography, while Prof. W. Kutta gives an account of photographic surveying from balloons. The articles on animal flight by Prof. Karl Müllenhoff, artificial flight by the late Otto Lilienthal and Mr. Octave Chanute, flying machines, motors and air-screws by Major Hermann Hoernes, complete the various sections of the subject. A list of aeronautical societies, numerous appropriate and useful tables, and an index conclude the volume.

In the preface it is stated that the suggestion of translating this work is due to Mr. Alexander, the well-known authority on aeronautics. English speaking aeronauts, therefore, doubly owe to him their gratitude, for the translator's work is not only excellently done, but he has adapted various tables for the use of English readers, and has added an index.

*Blackie's Nature-drawing Charts.* (London: Blackie and Son, Ltd., n.d.)

THIS is a series of fifteen sheets bearing coloured drawings of twigs or portions of a plant to show the nature of the flowers or fruit for use in art schools, more especially in schools of design. It is intended that the charts should be used in combination with living specimens, being displayed to serve as a guide in noting essential features and in producing an artistic drawing. Small figures are given of parts suited to conventional treatment, and several examples of conventionalised designs are presented on each chart. These show the adaptation of plant-forms for such purposes as brush-work ornamentation and the design of stencils, wall-papers, tapestries, &c.

A book of instructions is supplied to explain which charts or designs are suitable for different standards, and to provide other suggestions as to their